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NOTES FROM PACIFIC COAST OBSERVATORIES.

ORBIT OF THE SPECTROSCOPIC BINARY λ *ANDROMEDÆ*.[1]

The binary character of this star was announced by CAMPBELL in the *Astrophysical Journal* in 1899, and plates taken later in the same year showed the period to be $20^d.5$. The first eighteen plates were taken with the original Mills spectrograph, Hγ central, and the other thirty-eight with the remounted Mills, 4500 central. Definitive measurements seemed to show a discrepancy between the series taken with the first Mills spectrograph and the plates taken with the second Mills, and a complete series was secured with the new instrument in order to determine the nature of the disagreement. Least-square solutions were made of each series by the method of LEHMANN-FILHÉS, and following are the elements of the orbit resulting from each solution:—

	Old Series (1899).		New Series (1905).	
$U =$	$20^d.538$		$20^d.546$	
$\mu =$	$17^\circ.529$	$\pm\ 0.014$	$17^\circ.521$	$\pm\ 0.006$
$T =$	J.D. 2414571.81	$\pm\ 0.037$	2416683.46	$\pm\ 0.39$
$\omega =$	$336^\circ.2$	$\pm\ 7.6$	301.0	$\pm\ 7.6$
$K =$	6.48^{km}	$\pm\ 0.19$	7.07	$\pm\ 0.16$
$e =$	0.132	$\pm\ 0.038$	0.086	$\pm\ 0.018$
$V =$	$+\ 6.34^{km}$	$\pm\ 0.13$	7.43^{km}	$\pm\ 0.10$
$a \sin i =$	1.810000^{km}		$1.990\ 000^{km}$	
Probable error of single observation		$\pm\ 0.50^{km}$	$\pm\ 0.51^{km}$	

A series of plates taken after the lapse of a few years would no doubt establish or disprove the reality of the change in elements. Such a series should be taken in a single cycle of $20^d.5$ if possible, in order to eliminate the effects of changing elements and error in period. The discrepancy of the two sets of elements, if established, will no doubt be found to be due to a third body. The variation in ω and V is probably real, as it is five times the probable error in the former case, and check plates taken along with the star plates of both series show no systematic difference. K. BURNS.

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[1] For the full discussion of the orbit of this star see Lick Observatory *Bulletin*, No. 104.

November 21, 1906.

THE RADIAL MOTIONS OF *POLARIS*.

The motions of *Polaris* in the line of sight, as affected by its two invisible companions, have been carefully observed at frequent intervals since the Mills spectrograph established in 1899 that this star is a triple system. The binary system, consisting of the bright star and one of the unseen companions, has a well-established period of revolution, 3 days, 23 hours, 14 minutes; but the period of this binary system and the second unseen body remains unknown. Only an undetermined fraction of one revolution has been described since the beginning of my work on this star in 1896. The observed minimum values of the bright component's velocities are as follows, subject to slight corrections when the final reductions are made:—

1896.9	— 20.7$^{\text{km}}$ per second.
99.8	— 14.2
1900.6	— 14.6
01.4	— 16.3
02.6	— 16.8
03.0	— 17.2
03.7	— 17.8
04.5	— 18.5
06.5	— 19.8

Two sets of observations, consisting of eight or ten spectrograms each, secured in 1905, have not yet been reduced.

It appears from these figures that the position of minimum is gradually working its way down to that of 1896.9. The value — 20.7$^{\text{km}}$ furnished by the earliest observations is probably near one end of the range of velocities. The cycle of changes will not be complete until the values reach — 20.7$^{\text{km}}$ on the down or up curve described at 1896.9. The period may safely be said to exceed ten years, and is probably less than twenty years. W. W. CAMPBELL.